Geophysical Research Abstracts
Vol. 16, EGU2014-11943, 2014
EGU General Assembly 2014

The impact of large-scale circulation patterns on summer crop yields in IP

Mirian Capa Morocho (1), Belén Rodríguez Fonseca (2), and Margarita Ruiz Ramos (1)

(1) Politécnica de Madrid, Escuela Técnica Superior de Ingenieros Agrónomos, Producción Vegetal: Fitotecnia, Madrid, Spain (mi.capa@upm.es), (2) Universidad Complutense de Madrid. Facultad de Física: Departamento de Geofísica y Meteorología, Madrid, Spain (brfonseca@ucm.es))

Large-scale circulations patterns (ENSO, NAO) have been shown to have a significant impact on seasonal weather, and therefore on crop yield over many parts of the world(Garnett and Khandekar, 1992; Aasa et al., 2004; Rozas and Garcia-Gonzalez, 2012). In this study, we analyze the influence of large-scale circulation patterns and regional climate on the principal components of maize yield variability in Iberian Peninsula (IP) using reanalysis datasets. Additionally, we investigate the modulation of these relationships by multidecadal patterns.

This study is performed analyzing long time series of maize yield, only climate dependent, computed with the crop model CERES-maize (Jones and Kiniry, 1986) included in Decision Support System for Agrotechnology Transfer (DSSAT v.4.5). To simulate yields, reanalysis daily data of radiation, maximum and minimum temperature and precipitation were used. The reanalysis climate data were obtained from National Center for Environmental Prediction (20th Century and NCEP) and European Centre for Medium-Range Weather Forecasts (ECMWF) data server (ERA 40 and ERA Interim). Simulations were run at five locations: Lugo (northwestern), Lerida (NE), Madrid (central), Albacete (southeastern) and Córdoba (S IP) (Gabaldón et al., 2013). From these time series standardized anomalies were calculated. Afterwards, time series were time filtered to focus on the interannual-to-multiannual variability, splitting up in two components: low frequency (LF) and high frequency (HF) time scales. The principal components of HF yield anomalies in IP were compared with a set of documented patterns. These relationships were compared with multidecadal patterns, as Atlanctic Multidecadal Oscillations (AMO) and Interdecadal Pacific Oscillations (IPO).

The results of this study have important implications in crop forecasting. In this way, it may have a positive impact on both public (agricultural planning) and private (decision support to farmers, insurance companies) sectors, to take advantage of favorable conditions or reduce the effect of adverse conditions.

Acknowledgements

Research by M. Capa-Morocho has been partly supported by a PICATA predoctoral fellowship of the Moncloa Campus of International Excellence (UCM-UPM) and MULCLIVAR project (CGL2012-38923-C02-02)

References

Aasa, A., Jaagus, J., Ahas, R. and Sepp, M. 2004. The influence of atmospheric circulation on plant phenological phases in central and eastern Europe. *International Journal of Climatology* **24**, 1551-1564.

Gabaldón, C. *et al.* 2013. Evaluation of local strategies to climate change of maize crop in Andalusia for the first half of 21st century. European Geosciences Union - General Assembly2013 Vol. **15** (Vienna - Austria, 2013).

Garnett, E. R. and Khandekar, M. L. 1992. The impact of large-scale atmospheric circulations and anomalies on Indian monsoon droughts and floods and on world grain yields—a statistical analysis. *Agricultural and Forest Meteorology* **61**, 113-128.

Jones, C. and Kiniry, J. 1986. CERES-Maize: A Simulation Model of Maize Growth and Development. *Texas A&M University Press*, 194.

Rozas, V. and Garcia-Gonzalez, I. 2012. Non-stationary influence of El Nino-Southern Oscillation and winter temperature on oak latewood growth in NW Iberian Peninsula. *Int J Biometeorol* **56**, 787-800.